

XVIII.

WROUGHT IRON BRIDGES AS ADAPTED
TO THE COLONY.

BY FRANCIS BELL, C.E.

READ JUNE 7, 1855.

IN submitting this short paper to the Institute, it is my object to bring forward and invite discussion on a subject that I consider of the greatest importance to this colony at present, not only as regards its monetary condition, but with respect to its future prospects.

The subject of my paper this evening, is to show the great saving that would be effected by the introduction and construction of the wrought iron lattice girder bridge over every other kind of bridge, not only on railways, but on public roads. Since my arrival in the colony I have maturely considered this subject, and regret to find that so little notice has been taken by engineers of the materials and construction of bridges most adapted to the colony. The favourite material used at present seems to be wood, which does very well in the country districts for small spans, where large logs can be conveniently had, but where the spans increase to twenty-five feet and upwards, some other safer material should be used.

The timber of this colony is not well adapted for bridges of large spans, owing to its great tendency to warp and shrink, and also to a peculiarity which I have not observed in other timber, viz.: it shrinks with the fibre or lengthwise, this, as must be evident to even an unprofessional man, is a

very serious matter in engineering works, and I have found from experience at home, where timber does not shrink so much as it does in this warm climate; that in the summer the greatest attention is required to prevent shaking and oscillation, and additional stays and straps are frequently added to try and prevent this, but with very little effect, for the wood must shrink, and the iron straps, bolts, and tension rods expand at the same time, and in the winter season *vice versa*. Then, surely in this colony where the heat is so intense in the summer, all these effects must be greatly increased, and if it can be shown that a bridge or Viaduct could be constructed without these faults, and at a much less cost than wood, and infinitively less than stone, it would be of vast benefit hereafter, and would enable most important and useful works to be proceeded with that otherwise would be long delayed.

To illustrate this more fully, I will suppose a deep river has to be crossed with a span of fifty feet. I have made estimates of three different kinds of materials for spanning it, calculated at the present colonial prices, they are as follows, leaving out the abutments, which I have supposed to be the same in all:—

Constructed of stone it would cost	£5,000
Constructed of wood	1,600
Constructed of wrought iron lattice	550

Thus, it is evident the wrought iron lattice girder bridge of the form I propose, is immeasurably the cheapest; and now to determine its durability and strength. In the year 1847 I designed and had constructed of this formation, for the Cork and Passage Railway in Ireland, girders of fifty feet span; the cost for a double line of rails or three girders including flooring, was £414; weight 17 tons 3 cwt. 1 qr.; add to this freight, and cartage on 18 tons, with additional cost of erection in the colony, and it will come to about

what I have put down, £550; as this was the first lattice girder bridge of this form, constructed, Sir John Macneill was naturally anxious to test it, and Captain Wynn, the Government Railway Inspector put it to very severe tests before allowing this line to be opened for traffic; he caused one of the largest locomotives, with the tender filled with water and coke, weighing twenty-five tons, to rest on the centre of the girder, afterwards he caused the engine to be run across the viaduct at the greatest velocity attainable, at the rate of about seventy miles an hour—with all this there was not the slightest deflection observable.

I had several smaller girders afterwards constructed, of which these are drawings,* and afterwards on the Great Southern and Western Railway, and on the Killarney Junction Railway, I had six or seven constructed of different sizes and spans, and all with equal success, and since I have been in this colony I have had letters from the contractor stating he had orders for several others from three different railway companies, that they were the strongest, cheapest, and lightest bridges that could be erected, and were coming into general use.

To enumerate some of the advantages of adopting them in this country would be: the great facility of transport; for the lattice bars could all be cut, punched, and fitted, before coming out here, the entire being so light and in such small pieces, the cartage would be very trifling, and the rivetting could be easily done on the ground; then neither centring, scaffolding, or any expensive machinery is necessary, for all that is required for fixing them in their position is a few rollers and a crab windlass, as they can be rolled along the approach and placed with the greatest ease.

In conclusion, I have a strong conviction of their great superiority in strength, durability, and cheapness, for traversing large spans, and I have no hesitation in advocating

* The above drawings were laid before the meeting.

their introduction; it is, however, most essential, before opening them to the public, to submit them to severe and satisfactory tests; these tests have been various and frequent on those that have already been opened, and it may be safely affirmed, that in no case where Wrought Iron Box Lattice Girder Bridges have been duly proportioned and executed, has there been the least reason to doubt their security; they, furthermore, admit of being highly ornamental, and have, when erected, a most elegant, airy and light appearance.

I regret much that I have not been able to get a model prepared, as I had intended; it would have fully shown the construction, and enabled me to put it to a test, before this meeting.

I might here suggest that Prince's Bridge could be very easily widened by removing the present parapet and supporting the footpaths outside on a modification of the lattice girder, supported partly by brackets, this could be done at a very moderate cost, and be of infinite benefit to the public.

XIX.

THE TRANSLATION OF LANGUAGES.

BY WM. SYDNEY GIBBONS.

READ JUNE 7, 1855.

THE short paper which I have now the honour to lay before the Institute embodies views which I have at former periods had occasion to set before my pupils. The tone is necessarily